



Why Evidence-Based Medicine

On the Need for Evidence-
Based Medicine: The
Problems,
and Some Solutions

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Clinicians need Information

If asked:

- ⊗ we need it twice a week,
- ▮ we get it from our text books & journals.



Clinicians *really* need information!

If shadowed:

- ☼ need it up to 60 times per week (twice per every three patients), and affects 8 decisions per day.
- ▢ but we get only 30% of it,
- ▢ and that comes from passers-by
 - “my textbooks are out of date”
 - “my journals too disorganized”



Our textbooks *are* out-of-date

- ▮ Fail to recommend Rx up to ten years after it's been shown to be effective.
- ▮ Continue to recommend therapy up to ten years after shown to be useless.

Time spent reading around one's patients is slim:

Self-reports from Oxford (medians):

- ▢ Medical Students: 60 minutes per week
- ▢ House Officers: none
- ▢ S.H.O.'s: 10 minutes
- ▢ Registrars: 90 minutes



Time spent reading around one's patients is slim:

Self-reports from Oxford (medians):

- ▢ Senior Registrars: 45 minutes
- ▢ Consultants:
 - Post 1975: 60 minutes
 - Pre 1975: 30 minutes

Time spent reading around one's patients is slim:

Self-reports (median minutes last week):

- ☼ Medical Students: 60-120
- ▯ House Officers: 0-20 (up to 75%=none)
- ▯ S.H.O.'s: 10-30 (up to 15%=none)
- ▯ Registrars: 10-90 (up to 40%=none)



Time spent reading around one's patients is slim:

Self-reports (median minutes last week):

- ▮ Senior Registrars: 10-45 (up to 15%=none)
- ▮ Consultants:
 - Post 1975: 15-60 (up to 30%=none)
 - Pre 1975: 10-45 (up to 40%=none)

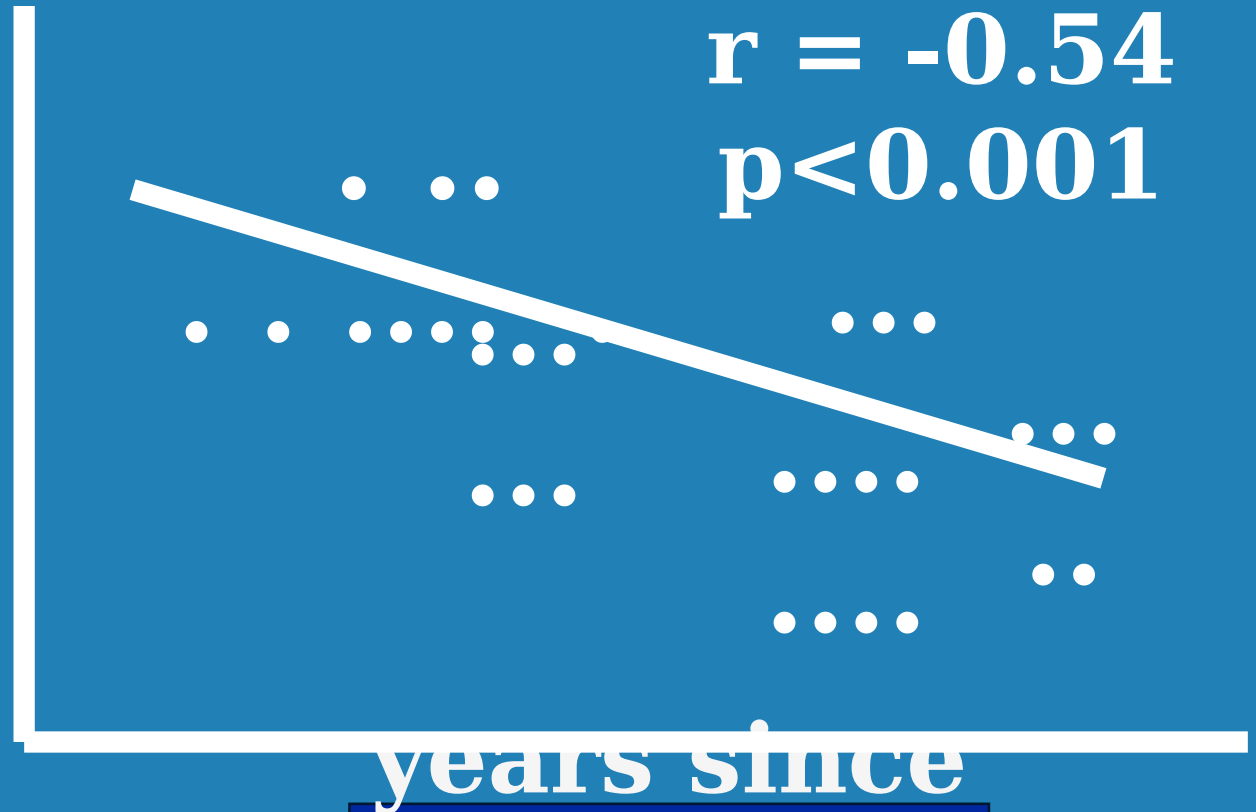


The inevitable consequence:

- ▮ on average, the clinically-important knowledge of physicians deteriorates rapidly after we complete our training.

The Slippery Slope

knowledge
of current
best care



years since
graduation



Performance deteriorates, too

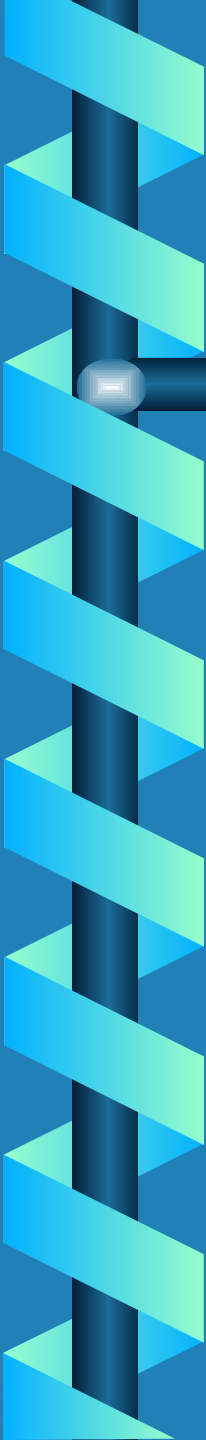
- ▮ Screened 6,000 steelworkers and found 300 untreated, uncontrolled hypertensives.
- ▮ Evaluated and confirmed their hypertension over the next 3 months.
- ▮ Got them into the offices of 85 local physicians.



6 months later, only 2/3 had been started on Rx

Determinants of the clinical decision to treat some, but not other, hypertensives:

- 1 The level of diastolic blood pressure.
- 2 The patient's age.
- 3 The amount of target-organ damage.
- 4 The amount of target-organ damage.



Performance deteriorates, too

Determinants of the clinical decision to treat some, but not other, hypertensives:

- 3 The physician's year of graduation from medical school.



Running Summary

- ▮ Clinicians need information, but most needs are never met:
 - Textbooks out of date.
 - Journals disorganized.
- ▮ Consequently, knowledge and performance deteriorate.



No wonder, then, that CME is mushrooming

- ▮ Big, and getting huge.
- ▮ Usually instructionally (fact) oriented.

Unfortunately, instructional CME doesn't work

For example:

- ☼ Identified “indicator conditions” whose management makes a difference in outcomes.
- ▮ Developed record audits that distinguished good from bad physicians, without penalizing good physicians who kept bad records. (Important Difference =10 points)

An RCT of CME

We gave the list of clinical conditions to a random sample of physicians, and asked them to identify:

- ⚙ ones for which they really DID want to receive CME (“high preference”).
- ▢ ones for which they really did NOT want to receive CME (“low preference”).
- ▢ hid a few away for later use.

An RCT of CME

Clinicians with similar preferences were randomized into:

- ☼ an Experimental Group (who would receive CME now for “high preference” conditions if they agreed to study “low preference” conditions, too).
- ▮ a Control Group (who would receive CME later).



An RCT of CME

“State-of-the-art” CME instructional packages were developed:

- ▮ full of objectives.
- ▮ in both written and audio formats.
- ▮ individualized, carry-away packages.
- ▮ frequent examinations for mastery:
 - with substantial gains in knowledge



An RCT of CME

Then measured the quality-of-care provided high-preference, low-preference, and “hidden” indicator conditions:

- ▯ in both experimental and control practices
- ▯ both before and after the former group received their CME



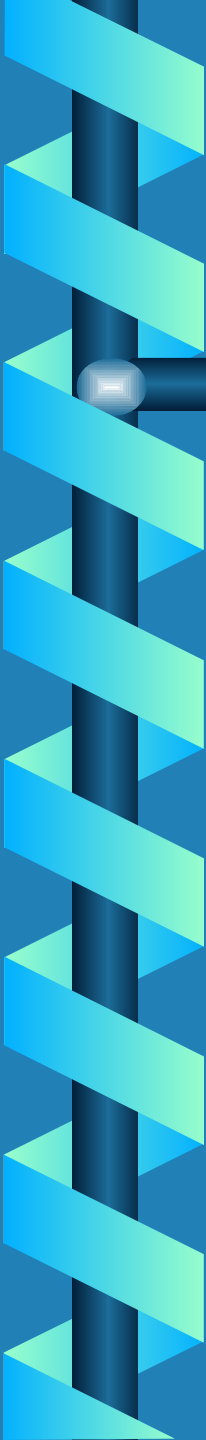
An RCT of CME: High Preference Conditions

- Quality of care rose slightly (statistically, but not clinically significantly) in the Experimental Practices
- An identical rise was observed in Control Practices !



An RCT of CME: High Preference Conditions

(“If you want CME, you don’t need it!”)



An RCT of CME: Low Preference Conditions

- ▮ Quality of care rose substantially in Experimental Practices.
- ▮ Quality of care declined slightly in Control Practices.



An RCT of CME: Low Preference Conditions

(“CME only works if you don't want it!”)



An RCT of CME: Hidden Conditions

- Quality of care deteriorated slightly in both Experimental and Control practices.



An RCT of CME: Hidden Conditions

("CME does not cause general improvements in the quality of care.")



Running Summary

- ▮ Clinicians need information, but most needs are never met:
 - Textbooks out of date.
 - Journals disorganized.
- ▮ Consequently, knowledge and performance deteriorate.
- ▮ Traditional instructional CME doesn't improve performance.



Three solutions

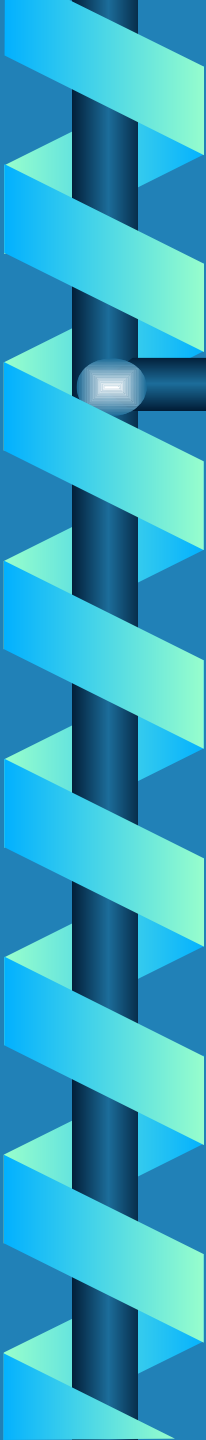
Clinical performance can keep up to date:

- 1 by learning how to practice evidence-based medicine ourselves.
- 2 by seeking and applying evidence-based medical summaries generated by others.
- 3 by accepting evidence-based practice protocols developed by our colleagues.



What evidence-based medicine is:

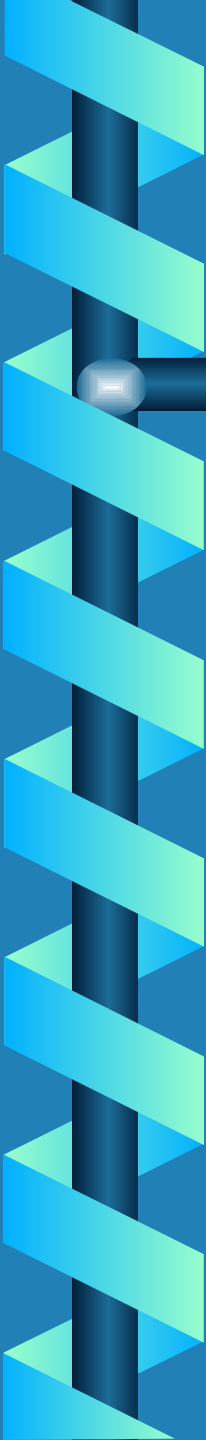
Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. Its philosophical base dates back to the skeptics of post-revolutionary Paris (Bichat, Louis, Magendie).



What evidence-based medicine is:

The practice of EBM requires the integration of

- individual clinical expertise
with the
- best available external clinical evidence
from systematic research.

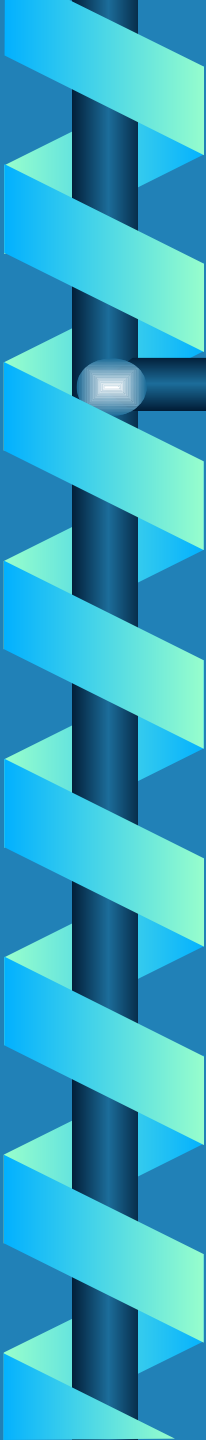


What evidence-based medicine is:

- ▮ **Individual clinical expertise: the increasing proficiency and judgement that clinicians acquire through experience and practice.**

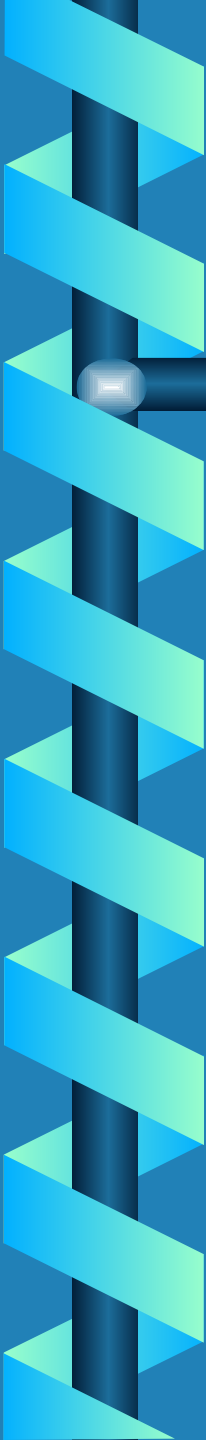
What evidence-based medicine is:

- ☼ **reflected especially in more effective and efficient diagnosis, and**
- ▮ **in the more thoughtful identification and compassionate utilization of individual patient's predicaments, rights, and preferences in making clinical decisions about their care.**



What evidence-based medicine is:

- ☼ clinically relevant research, often from basic sciences, but especially from patient-centered research
 - accuracy and precision of diagnostic tests (including the clinical examination)
 - power of prognostic markers
 - efficacy and safety of therapeutic, rehabilitative, and preventive regimens.



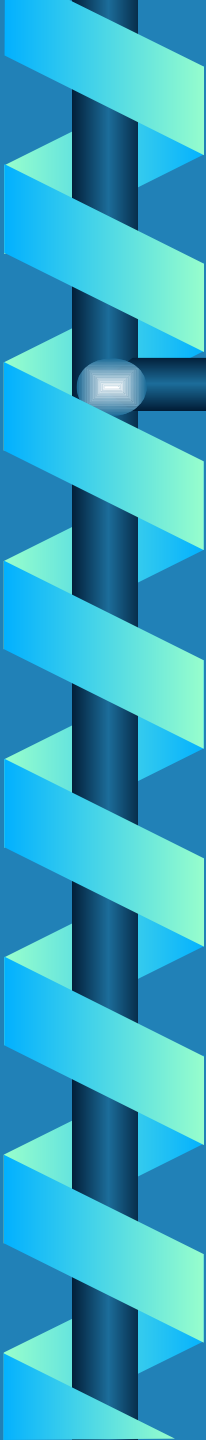
What evidence-based medicine is:

▢ External clinical evidence

- short doubling-time
- both invalidates previously accepted diagnostic tests and treatments, and
- replaces them with new ones that are more powerful, more accurate, more efficacious, and safer

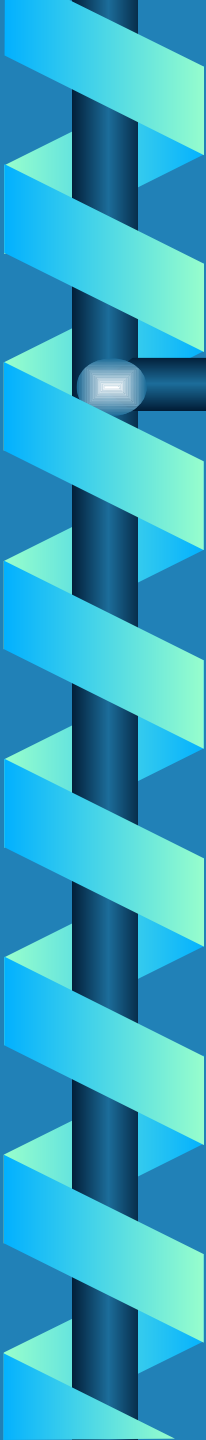
What evidence-based medicine is:

- ⊗ Good doctors use both individual clinical expertise and the best available external evidence, and neither alone is enough.
- ▮ Without the former, practice becomes evidence-tyrannized, excellent external evidence may be inapplicable or inappropriate for an individual patient.
- ▮ Without the latter, practice risks becoming rapidly out of date, to the detriment of patients and patient-care.



What evidence-based medicine is:

- this definition also helps us identify and understand what evidence-based medicine is not.



EBM is neither old-hat nor impossible to practice:

- ⊗ The former argument falls before the evidence:
 - variations in integration of patient values into clinical behavior
 - variations in rates which clinicians provide interventions of established benefit and uselessness to their patients.
 - inability of clinicians to keep abreast of important medical advances



EBM is neither old-hat nor impossible to practice:

- ▮ The latter argument, conducted only from ivory towers and armchairs, is refuted by audits in the front lines of clinical care where at least some inpatient clinical teams in general medicine, psychiatry, and surgery have provided evidence-based care to the vast majority of their patients.



Evidence-based medicine is not “cook-book” medicine:

- ▮ EBM requires that the best external evidence be integrated with individual clinical expertise and patient-choice in a bottom-up approach.
- ▮ External clinical evidence can inform, but can never replace, individual clinical expertise, which decides if the external evidence applies to the individual patient and how it should be integrated into a clinical decision.



Evidence-based medicine is not “cook-book” medicine:

- ▮ External guideline must be integrated with individual clinical expertise in deciding if and how it matches the patient’s clinical state, predicament, and preferences, and whether it should be applied.
- ▮ Clinicians who fear top-down cook-books will find the advocates of evidence-based medicine joining them at the barricades.



Evidence-based medicine is not “cost-cutting” medicine:

- ⦿ Fear that evidence-based medicine will be hijacked by purchasers and managers to cut costs of health care for individual patients.
- ▮ This is not a misuse of evidence-based medicine; it is a naive, fundamental misunderstanding of its financial consequences.



Evidence-based medicine is not “cost-cutting” medicine:

- ▯ Directed toward the benefit of individual patients, evidence-based medicine identifies and applies the most efficacious interventions to maximize their function, quality, and quantity of life, and may raise rather than lower the cost of their care.



EBM is not restricted to randomized trials:

- ▮ Practicing EBM requires the best clinical evidence to answer clinical questions.
 - Diagnostic tests: a proper cross-sectional study of patients suspected of having the target disorder
 - Prognosis: a proper follow-up study of patients assembled at a uniform, early point in the course of their disease.



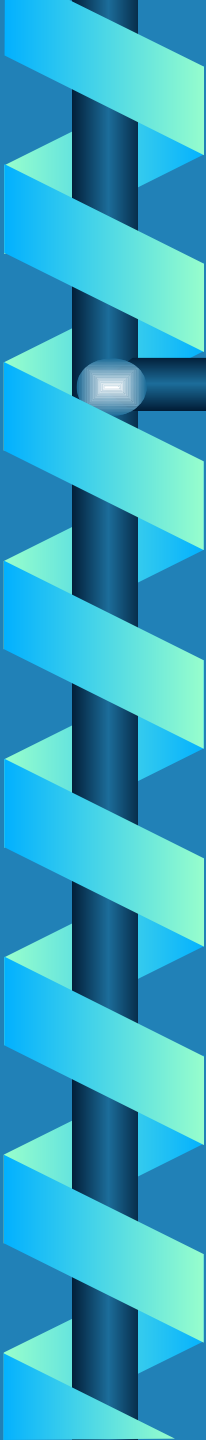
EBM is not restricted to randomized trials:

- ▮ Sometimes the evidence will come from the basic sciences.
- ▮ Only questions about therapy need experimental approaches to avoid false-positive conclusions about efficacy.
- ▮ Randomized trials and systematic reviews are the “gold standards” for judging if a treatment does more good than harm.



EBM is not restricted to randomized trials:

- ▮ However, some questions about therapy do not require randomized trials:
 - Successful interventions for otherwise inevitable outcomes
 - Cannot wait for the trials to be conducted.
- ▮ If no randomized trial exists for a patient's problem, we use the next best external evidence and work from there.



Evidence-Based Medicine: The Practice

When caring for patients creates the need for information:

- 1 Translation to an answerable question.
- 2 Efficient track-down of the best evidence
 - history and physical examination
 - diagnostic laboratory or suite
 - research report
 - other source



Evidence-Based Medicine: The Practice

- 3 Critical appraisal of the evidence for its validity and clinical applicability.
- 4 Application of the results of the critical appraisal in clinical practice.
- 5 Evaluation of one's performance.



Mastering some simple rules of evidence

- ▮ For determining clinical usefulness:
 - diagnostic/screening tests: do the results move my patient across a treatment/ no treatment threshold ?
 - therapy: how many patients like mine need to be treated with this therapy in order to prevent one clinical event (NNT)?



Where's the evidence about evidence-based medicine?

- ▮ Short term evidence from a trial among clinical clerks nearing graduation.
- ▮ Long term evidence from a natural experiment among clinicians up to 15 years following graduation.



Short term Evidence among Clinical Clerks: A Trial

- ▮ Experimental clerks: worked with Clinical Tutors who'd taken a crash course in critical appraisal and had worked up diagnostic tests and treatments bound to arise in their clerkship.
- ▮ Control clerks: worked with usual Clinical Tutors.



Short term Evidence among Clinical Clerks: A Trial

Before and after the clerkship, both sets of clerks were given patient scenarios:

- 1 describing the patient's clinical problem;
- 2 calling for diagnostic and treatment decisions;
- 3 accompanied by a clinical article advocating a specific diagnostic test or treatment for such patients.



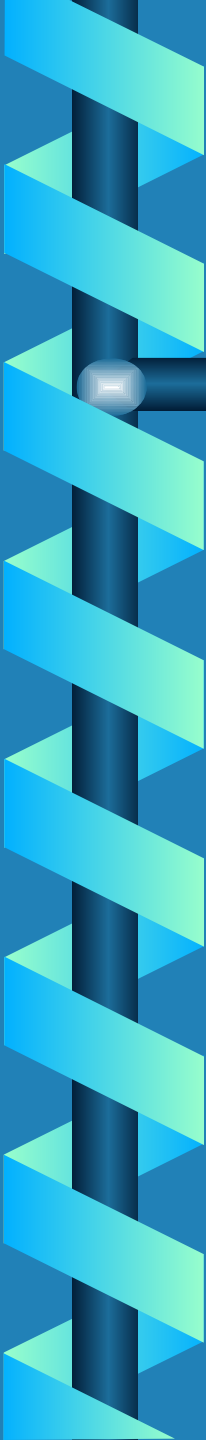
Short term Evidence among Clinical Clerks: A Trial

- ▮ After an evidence-based clerkship, Experimental Clerks made more correct decisions, and were better able to justify them.



Short term Evidence among Clinical Clerks: A Trial

- ⦿ Control Clerks deteriorated, and were more likely to be wrong after their clerkship than before it!
 - they had become more accepting of recommendations from authority figures.



Can the In-Patient Medical Service be Evidence-Based?

A Report from the Nuffield Department of
Medicine

at the Oxford-Radcliffe NHS Hospital Trust



The A-Team

- ▮ HOs: James Rowe and Jonathan Ellis
- ▮ SHO: Rowena Jones
- ▮ Registrars: Katie Jeffery & Sharon Peacock
- ▮ SR: Ian Mulligan
- ▮ Medical Students: Ben Box, Laura Burgoyne, Camille Carroll, Jo Chikwe, Gerry Christofi, Derralynn Hughes, Moyra Reid, Kopal Tandon, Clare Wood-Allum, & Sebastian Walter.



Conventional Wisdom

- ▮ “only about 15% of medical interventions are supported by solid scientific evidence” (BMJ Editorial)
- ▮ only 21% of 126 diagnostic and therapeutic technologies assessed by the US NIH were firmly based in research-generated scientific evidence



Even on the U.S. Talk-Shows

- ▮ “..... this would put 80 to 90 per cent of accepted medical procedures in this country under the heading of quackery!”

(source: Health Outrage of the Week)



Problems with Conventional Wisdom

- ▮ uses clinical maneuvers, rather than patients, as the denominator.
- ▮ tendency to focus on high-technology, “big ticket” items.
- ▮ reliance on simple literature searches will miss over half of the most rigorous types of evaluations.
- ▮ conducted from armchairs.



Performed an empirical study on a busy in-patient service

- ▮ on the general medicine in-patient service of the Nuffield Department of Medicine at the Oxford-Radcliffe NHS Hospital Trust (“The John Radcliffe”)
 - a university-affiliated tertiary care and District General Hospital
 - all admissions on urgent referral from local GPs or the Emergency Room



The Protocol

At time of discharge, death, or month's end, each patient was reviewed and consensus reached on:

- The primary diagnosis:
 - the disease, syndrome or condition most responsible for the patient's admission to hospital

The Protocol (cont.)

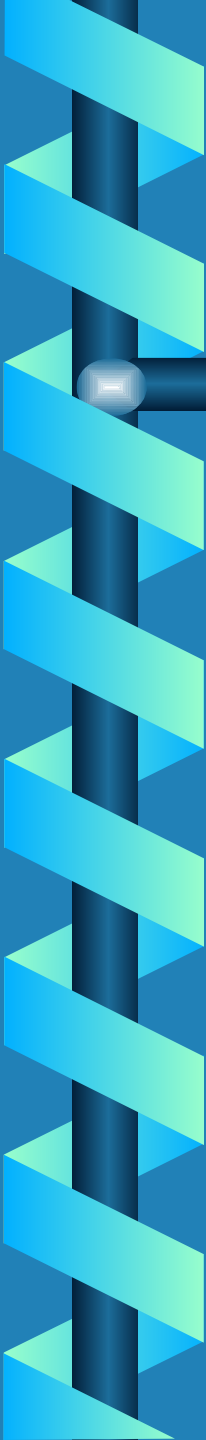
□ The Primary Intervention

- the treatment or other maneuver which was most important to cure, alleviate, or care for the primary diagnosis
- traced the literature to determine its basis in evidence
 - the Consultant's "Instant Resource Book"
 - bibliographic data base searches



Primary Interventions were Classified by Level:

- Evidence from Randomized Control Trials (or systematic reviews of RCTs)
- Convincing non-experimental evidence
- Interventions without substantial evidence



Patients

- ▮ 121 patients admitted in April 1995
- ▮ 109 diagnosed
 - 9 admitted the final day of the month
 - 3 remained undiagnosed



Summary of Interventions

Evidence-based: 82%

- Evidence from RCTs = 53%
- Convincing non-experimental evidence = 29%
- Interventions without substantial evidence = 18%

Evidence from RCTs (53%)

- ▮ 28 trials or overviews consulted.
 - 21 already in the “Redbook”
 - 7 identified through rapid literature searches

Evidence from RCTs (53%)

▮ 36% had Cardiovascular diagnoses:

- Ischemic heart disease 17%
- Heart failure 6%
- Arrhythmia 2%
- Thromboembolism 3%
- Cerebrovascular 8%

Evidence from RCTs (53%)

- ▮ 7% had taken poison
- ▮ 5% received chemotherapy or analgesia for cancer
- ▮ 3 % had gastrointestinal disorders
- ▮ 2% had obstructive airways disease



Convincing non-experimental evidence (29%)

- ▣ Infections 15%
- ▣ Cardiac disorders 7%
- ▣ Miscellany (non-compliance, drug reactions, bowel or bladder neck obstruction, dehydration, micturition syncope) 7%



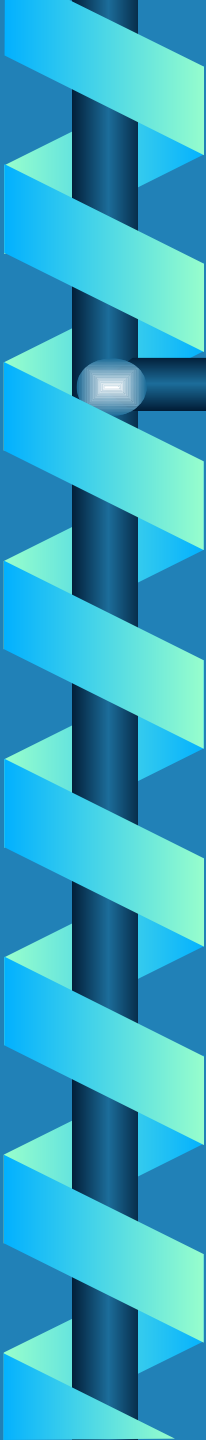
Interventions without substantial evidence (18%)

- ▮ Specific symptomatic and supportive care for mild poisoning, non-cardiac chest pain, viral (non-herpetic) meningitis, terminal CNS disease, confusion, and food poisoning.



Conclusions:

- ▣ 82% of patients admitted to a busy general medicine service received evidence-based care.
 - treatments for 53% were justified by RCTs or systematic reviews of RCTs.
 - treatments for 29% were justified by convincing non-experimental evidence
- ▣ The pundits got it wrong.



Evidence-Based General Practice

122 consecutive consultations in a suburban (Leeds, UK) practice.

- ☼ 81% evidence-based:
 - 31% based on RCTs or overviews
 - 50% based on convincing non-experimental evidence
 - 19% without substantial evidence

(Gill et al, BMJ 1996;312:819-21)